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ABSTRACT

The purpose of this study was to determine whether the World Wide Web is being used by hospitals to facilitate the transfer of information to the public. One hundred ninety-one hospitals chosen from "Profiles of U.S. Hospitals" were selected for a web site survey. Each member of the sample was searched on the World Wide Web in an attempt to locate their web site if one existed. Subsequently, each web site found was evaluated to determine its quality and usefulness; previously published criteria were modified and used to evaluate the web sites. Criteria were grouped under one of three categories: access, design, or content. Statistical analysis showed that 37% of the sample had web sites. The percentage of those with web sites was calculated in each of the three categories of ownership, location, and teaching status of the hospital. Twenty-seven percent of government owned, 13% of investor owned, and 41% of not for profit hospitals had web sites. In the category of location, 33% of rural and 37% of urban hospitals had web sites. Concerning teaching status, 44% of major teaching, 27% of minor teaching, and 32% of non-teaching hospitals had web sites. An analysis of the scores earned by the web sites during evaluation was also reported. The mean score received by the web sites on the entire list of criteria was 75%. The criteria were then analyzed in relation to the categories of access, design, and content. The mean scores for these categories were, access criteria 95%, design criteria 73%, and content criteria 68%. Six tables show percentages and mean scores. The hospital web site search and evaluation criteria survey are appended. (Contains 15 references.) (Author/AEF)

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SURVEY AND EVALUATION OF HOSPITAL WEBSITES

A Master's Research Paper submitted in partial fulfillment of the requirements for the degree Master of Library Science

by

Dawn R. Smith

May, 1997

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Master's Research Paper by

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A study was conducted of 191 randomly selected hospitals to determine whether or not they had websites. Each member of the sample was searched on the World Wide Web in an attempt to locate their website if one existed. Subsequently, each website found was evaluated to determine its quality and usefulness. Previously published criteria were modified and used to evaluate the websites. Criteria were grouped under one of three categories access, design, or content. Statistical analysis showed that thirty-seven percent of the sample had websites. The percentage of those with websites was calculated in each of the three categories of ownership, location, and teaching status of the hospital as well. Twenty-seven percent of government owned, thirteen percent of investor owned, and forty-one percent of not for profit hospitals had websites. In the category of location, thirty-three percent of rural and thirty-seven percent of urban hospitals had websites. Concerning teaching status, forty-four percent of major teaching, twenty-seven percent of minor teaching, and thirty-two percent of non-teaching hospitals had websites. An analysis of the scores earned by the websites during evaluation was also reported. The mean score received by the websites on the entire list of criteria was seventy-five percent. The criteria were then analyzed in relation to the categories of access, design, and content. The mean scores for these categories were, access criteria ninety-five percent, design criteria seventy-three percent, and content criteria sixty-eight percent.

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CHAPTER I . INTRODUCTION

Background

The Internet has quickly become an important force in information dissemination and management. The World Wide Web is a particularly useful method for individuals, businesses, and organizations to provide others with information about themselves. Among the fields taking advantage of the Internet is the healthcare industry. It has become a valuable tool for communicating and sharing information within the healthcare industry. Hospitals may benefit specifically from having a presence on the World Wide Web. With competition between hospitals tougher than ever, getting information about themselves to potential patients is very important. A website that allows them to provide the public with health information, as well as basic information about their staff and facilities, may go a step further than what can be accomplished on the radio or television. In addition to a simply having a website, a hospital must ensure that it is of good quality, contains pertinent up to date information, and allows users to easily locate the desired information.

Rationale for the Study

The literature examined in the area of healthcare and the Internet, dealt extensively with the use of the Internet and World Wide Web to facilitate the transfer of information within the field of medicine. However, no literature was discovered concerning the use of the World Wide Web to facilitate the transfer of information to the public. And although there is some literature concerning

the evaluation of Web resources, none pertained to hospitals specifically. It was hoped that a survey and evaluation of hospital websites would be a useful addition to the literature in the area of healthcare and the Internet.

Purpose of the Study

The purpose of this study was to determine whether the World Wide Web is being used by hospitals to facilitate the transfer of information to the public. Specifically, what percentage of hospitals surveyed have a website? Also, of those with a website, what is the percentage with websites for urban and rural locations; government, investor, and not-for-profit owned hospitals; major teaching, minor teaching, and non-teaching facilities? In addition, it was hoped that the quality of the information package being offered would be determined by performing an evaluation of each website discovered. The evaluation criteria were chosen to answer three different questions. What percentage of the websites surveyed fulfill what portion of the criteria categorized under access? What percentage of them fulfill what portion of the criteria categorized under design? And finally, what percentage fulfill what portion of the criteria categorized under content?

Definitions and Limitations of the Study

The time span of this study was December, 1996 through February, 1997. The scope was confined to general acute care hospitals with at least five hundred beds. General acute care is defined as serving the general population, as opposed to serving only a special population, as would

a children's, psychiatric, or rehabilitation hospital.

Several other terms and concepts should be defined in order to make the research in this paper understood. To begin with, the Internet, also known as "the net", is a worldwide system of computers linked together sharing the same communication protocols. It has its roots in a project called ARPANET which was sponsored by the United States Department of Defense Advanced Research Projects Agency (ARPA). The original intent was to build a network capable of carrying military and government information during a "nuclear event". The project was started in 1968 and soon developed into a more general goal of developing techniques to build a large-scale network (Hahn 1996).

The World Wide Web (also called the "WWW", "W3", or simply "the Web") is a tool developed at the European Laboratory for Particle Physics (CERN), and launched in 1989 to provide a method for delivering graphical documents over a network. It is a collection of sites all around the world that communicate using HTTP (HyperText Transfer Protocol). The Web is designed around a distributed client-server architecture. The client is a program which can send requests for documents to any server. The server is a program that processes the request and sends the document to the client. A distributed architecture means that a server and client may be running on completely separate machines (Kumar and Manocha, 1995).

There are also several terms which relate to the World Wide Web. Uniform Resources Locators (URL) are used to represent links, files, and services on the Web. An example would be http://www.library.kent.edu. The part of the URL before the two slashes specifies the method of access. The part following the slashes is usually the address of the computer where the data or service is located. Parts after that may specify names of files, a port to which to connect, or text for which to search in a database. HTML (Hypertext Markup Language) is a set of specifications for

embedding instructions within regular text in order to create a Web document. Hypertext is information on the Web that contains links to other information or services. An ASCII browser is a type of software that allows browsing on the web in a text only mode. Because it does not display graphics, a web page that relies heavily on graphics to convey its information, can be confusing and unclear for a viewer if text only alternatives have not been built into it.

The High Performance Computing and Communications (HPCC) Program should also be defined. Begun in 1991, it is a multi-agency federal program to extend U.S. leadership in high-performance computing and networking technologies.

CHAPTER II . LITERATURE REVIEW

Literature pertaining to the research in this paper comes from two different areas. The first is the area of medicine and the Internet. Research that has been done within this scope is relevant because it is important to understanding the tremendous effect the Internet is having on the field of medicine. The second area is the evaluation of Web resources. This literature provides an understanding of what aspects of Web resources should be evaluated and, at times, gives examples of both high and low quality Web publishing.

The National Library of Medicine has taken a prominent role in getting hospitals connected to the Internet. By its participation in the High Performance Computing and Communications (HPCC) Program, it assists hospitals and medical centers with connecting to the Internet through projects directed by the Regional Medical Libraries and through an Internet Connections Program cosponsored by the National Science Foundation. NLM was the first Public Health Service component to participate in the HPCC Program (Lindberg 1995). Interest in healthcare reform has focused attention on the role that the National Information Infrastructure might be able to play in reducing costs, improving quality, and increasing access to health care.

As of late 1991, only a few hospitals had a direct Internet connection. Most of these were large research institutions. In the fiscal year 1992, the NLM decided to provide grants to health sciences institutions similar to those offered to universities by the National Science Foundation. Two types of grants were offered: up to $30,000 for an initial connection and up to $50,000 for those institutions wishing to extend an existing Internet connection to other institutions. Requirements attached to the grants included that access must be extended to all users in an institution as opposed

to one or two departments; local-area networks must be in place to indicate some level of internal networking that can be connected to a regional network; standard communications protocols such as TCP/IP must be available; on-site expertise in computers and communications technologies must be available; and programs must be planned for teaching Internet use. Institutions must assume responsibilities for all expenses after the grant expires. In 1992, twenty-two applications were received, resulting in ten awards. In 1993, fifty-seven applications were received and sixteen funded. The NLM allocated $400,000 each in fiscal years 1992 and 1993. At that time they planned to expend $850,000.00 in FY 1994 (Cern 1994).

An example of the NLM Connections Program funding exists at the University of Arizona. An application for $50,000.00 was made in order to promote statewide collaboration in supporting UA's health sciences education and research programs by expanding network connectivity to hospitals and other health-related institutions. Each major non-university teaching hospital would secure and maintain a leased communications line dedicated to network connectivity, and funds would be used to buy some necessary hardware. Funds would also be used to establish a modem bank for dial-up Internet access by rural practitioners and teaching sites (Anderson et al. 1994). NLM/NSF funds provided the catalyst for the establishment of Internet connectivity for the core Arizona's health sciences education system. An immediate means of facilitating access to education, research, and information resources was provided by the funding. Additionally, collaboration among institutions was stimulated improving possibilities for savings in cost and effort.

Another example of the medical field's strides toward Internet access is a pilot project in the Pacific Northwest United States funded by the NLM. The study focused on seven community hospitals where it was felt that the economic pressures faced are at least as great as those in urban

areas, but where access to information is often inadequate (Rambo and Fuller 1994). It was found through the pilot study that health professionals presently rely on the Internet for a variety of communications purposes even more than for accessing specific types of information (Fuller 1995). Health care reform is resulting in new alliances of health care institutions, including not only hospitals but physician offices, clinics, and departments of health as well. Communications among these geographically distributed institutions and individuals is vital. High-quality, cost-effective health care will not be possible without integrated information management and the access to information that the Internet makes possible (Rauch et al. 1994).

At the University Hospital of Geneva, in Geneva Switzerland, there is the example of ExPASy. It provides rapid access worldwide to information on genes and proteins, their structure and their implication for biological processes and diseases. The ExPASy server uses hypermedia to combine a large amount of medical and biological information and links several concepts in medicine. WWW and Mosaic, used to build ExPASy, offer hypertext-oriented media that assemble multiple databases over the network. Its design might be used as a model for medical concept representation and, therefore, could stimulate wider applications in medicine (Hochstrasser et al. 1995).

The University of Minnesota Hospital and Clinic deploys a Web based medical information system called CIS (Clinical Information System). It makes available laboratory results, including a radically improved clinical microbiology reporting system, ad hoc laboratory order entry, and an embedded expert system protocol laboratory ordering system. Formal evaluation of the system has shown a significant savings in clinician time and substantial reduction in interpretive errors (Willard et al. 1995).

Evaluation of websites has become increasingly popular as people have realized that quality is not always a concern of those creating the sites. Examples such as an evaluation of government websites show quality to be questionable (Johnson 1996). Websites were found that were simply a compilation of existing information sources that had been converted to HTML format and dumped on the Web. The author believes that the mounting of government websites is based on a range of motivations that are not necessarily in the interest of providing effective information services. Some of these motivations might be that other governments are doing it, it's new and interesting and a lot of fun, and we need to position ourselves as the people who "do" the Web before our superiors give the job to someone else. Many of the websites looked at were incomplete, poorly designed, made up of large chunks of hastily "HTMLised" text with inadequate structure for the Web environment, contained inactive links, or links to incomplete information.

A review of websites for online service companies showed that their use of the Web seems to be targeted mainly at explaining or advertising their services (Green 1995). The usefulness of a site was shown to depend mainly on the company's commitment to supporting, improving, and updating the site with current information. At the time the article was written, few had declared their websites completely functional. Almost every site contained non-functional links and warnings that parts were "under construction."

Problems have been encountered by anyone trying to find enlightenment on the World Wide Web. This is exemplified by the search for a specific film guide on the Web (Kruger 1995). The author compares the Web to a war in which the ability to make vast territorial gains within a short time has left supply lines weak, and in some areas colonization is no more than a flag hoisted over one or two municipal buildings. He also states that people are becoming capable users of the technology faster than the content providers can meet their needs. He contends that while it will still

be possible for anyone to contribute information to the Internet, methods of grading and performing quality control will appear. We may eventually even see a standard for web pages which will include the author's name and e-mail address, keywords and the equivalent of an ISBN number.

Specific criteria for evaluating websites makes choosing useful sites easier. One set of measures is divided into four characteristics (Gurn 1995). Accessibility measures the ease of getting into a site. The predictability of entry to a service is an important factor. Frustrating users before they even reach a service does not add to the user friendliness of the site. Authority is the second factor. Data that is expected to change or is time sensitive requires the most care in noting authority. The ease with which the user finds authority is part of the user friendliness of the site. Interactivity allows the user to exchange information with a service. This aspect is where the real value to the user is made clear. The ability to interact must be made friendly in order to be a service to the user. The last characteristic, conviviality, describes the ease with which the user interacts with an online service. It can be compared to "user friendliness." Conviviality is connected by nature to accessibility, authority, and interactivity.

Criteria selected for use in this paper were modified from yet another work (Caywood 1996). The criteria are divided into three categories. The first category, access, includes concepts relating to the ease with which the user can link to the website. The second category, design, consists of criteria to determine how easy the site is to use once linked to it. Finally, the third category, content, measures whether the information contained at the website is actually pertinent and useful. The criteria were developed for assessing the value of websites to library patrons.

CHAPTER III . METHODOLOGY

Selection of the Sample

Hospitals for this study were chosen from *Profiles of U.S. Hospitals*, published annually by HCIA. This publication presents the most current and comprehensive information available on nearly every hospital in the United States. The primary source of data used to compile Profiles of U.S. Hospitals is the Medicare cost report, which is filed annually by every U.S. hospital that participates in the Medicare program. The accuracy of the information contained in the cost report is certified under penalty of law. All hospitals listed as general acute care and having at least five hundred beds were candidates for selection. Of the three hundred and fifty-five hospitals that fulfilled the criteria, one hundred ninety-one were randomly selected for the website survey. A simple random sample was done using the Rand Corporation's *A Million Random Digits*.

Procedure for Gathering Information

After the sample was selected, each member of the sample group was searched on the World Wide Web using the search engine Alta Vista. It was then noted whether a website existed for that particular hospital. If a site was found, an analysis was then done in order to evaluate it according to specific criteria. It is recognized that many of the criteria are subjective. This is, however, the nature of evaluative investigation. Explanations have been provided to clarify some criteria.

The criteria used for this study represented a modified version of criteria published in

another work that was discussed in the literature review section of this paper (Caywood 1996, 169). In relation to access the following questions were asked. Is the site useful with an ASCII browser? The ASCII browser LYNX was used to determine the answer to this question. Do parts take longer than ten seconds to load? Is it usually possible to reach the site? Is the Uniform Resource Locator (URL) stable? Linking to the site several times over the course of this investigation was attempted in order to answer the previous two questions. Are all parts of the site open to all users? If not, are rules for use stated up front? Questions asked concerning design of the site included the following. Are the individual web pages concise? The answer to this was deemed no if extensive scrolling was necessary to get to information and links. Do essential instructions appear before links and interactive portions? Do all the parts work? Is using the site intuitive? It was considered intuitive if it was not likely that parts would be misunderstood or the user would become confused by its set up. Does it do more than can be done with other media? In other words does it accomplish more that what the hospital could accomplish by providing people with brochures or advertising on television, radio, or newspaper. Can the user interact with the website? Some examples of interaction would be setting appointments, getting referrals to physicians, or asking health related questions through the website. If so, are interactions secured? This was determined by using the view document information feature of Netscape. The following questions were asked in relation to the content of the websites. Are the scope and limits of the website clearly stated? If so, does the content fit the stated scope? Does the content provide information to the general public? Is the content suitable to the expected audience? Are the links suitable to the expected audience? Is information given as to when the site was last updated? Is the content of ongoing use? Is the origin of the content documented? Is the content consistent throughout? Is contact information provided for the person(s) responsible for the content?

After searching for each hospital's website and noting whether one existed (see Appendix A), statistical analysis was used to calculate the frequency and percentage for the total hospitals with websites. The percentage of hospitals with websites was then determined for each of the categories of rural and urban; government owned, investor owned, and not-for-profit; major teaching, minor teaching, and non-teaching. These categories were assigned to the hospitals by *Profiles of U.S. Hospitals*. According to this source rural versus urban location of a hospital is defined by the U.S. Bureau of the Census on the basis of its location within or outside a metropolitan statistical area (MSA). Additionally, a facility defined as a major teaching hospital is a member of the Council of Teaching Hospitals (COTH), a group of about 400 members that represents the largest and most prestigious teaching hospitals in the country. A minor teaching hospital is one that has at least one intern and resident and is not a member of COTH. Finally, a non-teaching hospital is neither affiliated with COTH nor has any interns or residents.

Further analysis showed what percentage of hospitals fulfilled what percentage of criteria in each of the three categories of access, design, and content. Class intervals were created for the criteria as follows: 96-100%, 91-95%, 86-90%, 81-85%, 76-80%, 71-75%, 66-70%, 61-65%, 56-60%, 51-55%, 46-50%, 41-45%, 36-40%, 31-35%, and 26-30%. A simple yes/no answer form was used to determine whether or not each of the criteria was met (see appendix B).

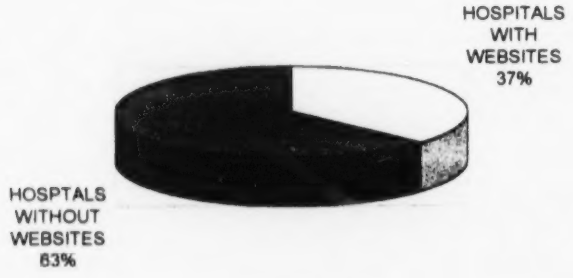
The last section of statistical analysis reports the mean score for each type of hospital mentioned earlier under the categories of ownership, location, and teaching status.

CHAPTER IV . RESEARCH FINDINGS

It should be mentioned that all searching was completed by January 17, 1997. Any website that was created after that date is not included in this study. In addition, all evaluations were completed by February 12, 1997. Therefore, any changes made to a website after that date are not included in these evaluations.

After searching the Web for the hospitals' websites, it was discovered that of the one hundred ninety-one hospitals in the sample, seventy had websites. This meant that thirty-seven percent did have a site while sixty-three percent did not have a site (see figure 1). According to designations given by *Profiles of U.S. Hospitals*, this analysis can be broken down into different types of hospitals. Categories include ownership, location, and teaching status (see Chapter 3 for definitions of categories).

Figure 1. Percentage of hospitals with websites



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Of the government owned hospitals twenty-seven percent had websites, while only thirteen percent of investor owned hospitals had websites. Not for profit hospitals topped the category with forty-one percent having websites. It was surprising that investor owned hospitals did not seem to taking more advantage of the web as an advertising possibility.

In the category of location (rural vs. urban), thirty-three percent of rural hospitals in the sample had websites. This is comparable to the figure of thirty-seven percent for urban hospitals. From this sample it appears that large rural hospitals are doing almost as well as large urban hospitals in making use of the web.

The last category, teaching status, showed that forty-four percent of major teaching, twenty-seven percent of minor teaching, thirty-two percent of non-teaching hospitals had websites. It was surprising that major teaching hospitals, with their links to education, might have better access to new technologies. What is somewhat surprising is that non-teaching hospitals had more websites than minor teaching hospitals (see table 1).

As was mentioned in the methodology section of this paper, statistical analysis showed the mean score for the websites as well as what percentage of hospitals fulfilled what percentage of criteria. This was first calculated in relation to all criteria then in relation to the criteria as it was divided into the three categories of access, design, and content. Score intervals were created for the criteria as follows: 96-100%, 91-95%, 86-90%, 81-85%, 76-80%, 71-75%, 66-70%, 61-65%, 56-60%, 51-55%, 46-50%, 41-45%, 36-40%, 31-35%, and 26-30%. A simple yes/no answer form was used to determine whether or not each of the criteria was met (see appendix B).

Table 1. Percentage with Websites by Hospital Type

Hospital Types	Percentage with Websites
Ownership	
Government	27
Investor	13
Not for Profit	41
Location	
Rural	33
Urban	37
Teaching Status	
Major Teaching	44
Minor Teaching	27
Non-teaching	32

After an evaluation for each website was completed the following observations were made concerning the percentage of all criteria fulfilled. The mean score for the websites in relation to all criteria was 75%. Further, thirteen percent of hospitals fell in the 86-90% range of scores, seventeen percent in the 81-85%, thirty-four percent in the 76-80%, sixteen percent in the 71-75%, thirteen percent in the 66-70%, six percent in the 61-65%, and one percent in the 56-60% (see table 2). This meant that the highest percentage of criteria fulfilled was in the range of 86-90% with only nine hospitals achieving it. Seventy percent of the hospitals did not fulfill twenty percent or more of the criteria.

If a break down by criteria category is observed, it is possible to see in which area the websites were weakest. The mean score in the category of access criteria was ninety-five percent. Dividing the scores into intervals shows that seventy-four percent were in the 96-100% range, nine

Table 2. Percentage of all Criteria Fulfilled by Hospitals

Score Intervals (%)	Hospitals within Given Range (%)
86-90	13
81-85	17
76-80	34
71-75	16
66-70	13
61-65	6
56-60	1

percent in the 81-85%, thirteen percent in the 76-80%, three percent in the 66-70%, and one percent in the 56-60% (see table 3). Obviously, the majority of them did very well in this area. The criteria that were missed most concerned the amount of time it took for web pages to load and whether all parts of the site were open to all users. The percentage of hospitals that missed these criteria were nine percent and eleven percent respectively.

Table 3. Percentage of Access Criteria Fulfilled by Hospitals

Score Ranges (%)	Hospitals within Given Range (%)
96-100	74
81-85	9
76-80	13
66-70	3
56-60	1

In the category of design the mean score was seventy-three percent. The score interval break down was as follows: thirty-nine percent in the 86-90% range, forty percent in the 71-75%, one percent in the 61-65%, nine percent in the 56-60%,one percent in the 46-50%, six percent in the 41-45%, one percent in the 36-40%, and three percent in the 26-30% (see table 4). Scores dipped much deeper in this category and did not rise as high as in the previous one. The criteria most missed were whether the site did more than could be done with other media and whether the user could interact.

Table 4. Percentage of Design Criteria Fulfilled by Hospitals

Score Ranges (%)	Hospitals within Given Range (%)
86-90	39
71-75	40
61-65	1
56-60	9
46-50	1
41-45	6
36-40	1
26-30	3

Thirty-nine percent missed the former and seventy-one percent missed the latter. What was even more concerning is that of the twenty-nine percent that did allow interaction none of them encrypted or secured the interactions in any way.

The third category, content, shows the scores dropping further. The mean score was sixty-eight percent. Only one percent scored in the 96-100% range and only two percent in the 86-90% range. The majority were clumped solidly between fifty-six and eighty percent with twenty-nine percent in the 76-80%, forty-one percent in the 66-70%, and twenty-three percent in the 56-60% range. Three percent of the hospitals rounded out the category of content in the 41-45% range (see table 5). This certainly pointed toward content as the largest problem for hospital websites. Looking at specific criteria in the area of content it was obvious where the websites were weakest. Certain criteria were failed by almost all of the sites. Ninety-one percent did not state the scope and limitations of the website. Ninety-six percent did not document the origin of the content. Finally, sixty-seven percent did not give information as to when the site was last updated.

Table 5. Percentage of Content Criteria Fulfilled by Hospitals

Score Ranges (%)	Hospitals within Given Range (%)
96-100	1
86-90	2
76-80	29
66-70	41
56-60	23
41-45	3

To see how hospitals faired according to the categories of ownership, location, and teaching status, mean scores were calculated for each group. In the category of ownership, the mean score

for investor owned hospitals was seventy-seven percent followed by not for profit hospitals with a score of seventy-five percent. Government owned hospitals were in last place with a mean score of seventy-three percent. Interesting to note is that although investor owned hospitals had the lowest percentage of websites, their sites had the highest mean score.

In relation to location, urban hospitals had a mean score of seventy-five percent while rural hospitals had seventy-one percent as their mean score.

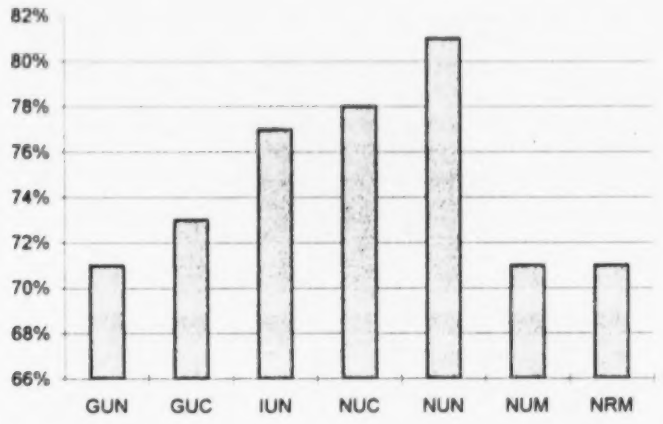
Finally, in the category of teaching status, non-teaching hospitals had the highest mean score at seventy-eight percent, major teaching hospitals followed with seventy-five percent, and minor teaching hospitals were last with seventy-one percent (see table 6). Also, non-teaching hospitals, which ranked in the middle of the three groups in percentage with websites, scored the highest in the evaluation phase.

Table 6. Mean Score by Hospital Type

Hospital Types	Mean Score (%)
Ownership	
Government	73
Investor	77
Not for Profit	75
Location	
Rural	71
Urban	75
Teaching Status	
Major Teaching	75
Minor Teaching	71
Non-teaching	78

The combination of the above mentioned attributes created seven different groups in which hospitals fit. GUN representing government, urban, non-teaching; GUC representing government, urban, major teaching; IUN representing investor, urban, non-teaching; NUC representing not for profit, urban, major teaching; NUN representing not for profit, urban, non-teaching; NUM representing not for profit, urban, minor teaching; and NRM representing not for profit, rural, minor teaching. Mean scores were calculated for each group. Hospitals with the GUN designation had a score of seventy-one percent, followed by GUC with seventy-three percent, IUN with seventy-seven percent, NUC with seventy-eight percent, NUN with eighty-one percent, NUM with seventy-one percent, and NRM with seventy-one percent (see table 7). These scores show that not for profit, urban, non-teaching hospitals received the highest mean score on the evaluation.

Figure 2. Mean Scores by Hospital Type Combinations



CHAPTER V. SUMMARY AND CONCLUSIONS

This study set out to answer several questions pertaining to hospitals and the World Wide Web. These included the following. What percentage of hospitals had websites? What percentage had websites according to urban and rural location; government owned, investor owned and not for profit; major teaching, minor teaching, and non-teaching facilities? Additionally, it hoped to provided some sense of the usefulness and quality of the websites found. Criteria were selected to score the websites in the areas of access, design, and content (see appendix B).

A random sample of hospitals with five hundred beds or more was selected. The hospitals were searched on the World Wide Web using the search engine Alta Vista. The percentage of those with websites was calculated overall and in the above mentioned categories. The websites were then evaluated according to the selected criteria and scores were calculated for them in relation to all criteria and in relation to each of the criteria categories of access, design, and content. Mean scores were also calculated for the criteria categories as well as by hospital type (see previous paragraph).

Major findings included the following. Only thirty-seven percent of hospitals had websites. In the category of ownership, not for profit hospitals had the highest percentage with websites at forty-one percent. Urban hospitals had the highest percentage in the category of location with thirty-seven percent having websites. Finally, in the category of teaching status, major teaching facilities had the highest percentage at forty-four percent.

After website evaluations were completed several facts were evident. Scores were highest in the criteria category of access and lowest in content. In the access category the mean score was

ninety-five percent, in design seventy-three percent, and in content sixty-eight percent. The mean score for all hospitals in relation to all of the criteria was seventy-five percent.

Website scores were also looked at in relation to the type of hospital. Investor owned hospitals had a mean score of seventy-seven percent, the highest in the category of ownership. Urban hospitals had a mean score of seventy-five percent, the highest in the category of location. Finally, non-teaching hospitals had the highest for the category of teaching status with a mean score of seventy-eight percent. Combining these attributes showed that hospitals with highest mean score were not for profit, urban, non-teaching hospitals.

When done well, hospital websites are very informative and helpful to the public. They provide both hospital specific information and general health information. A well done website is also beneficial to the hospital's staff, who may use it as part of job requirements, and of course to the hospital itself as an advertising opportunity. A satisfying journey through their website can create a positive feeling toward them as a healthcare provider. On the other hand, a frustrating experience on their website can put a user off as a potential patient as well. All three areas of criteria used in this evaluation have the potential to do either one based on whether or not the website fulfills them adequately.

The reported previously in this chapter, most hospitals did well in the category of access. This is very important. A user does not want to be frustrated by waiting a lengthy period of time for information to load or have trouble finding the site because the URL has changed.

Likewise, the design of the website should not hinder their acquisition of information. Noticeable problems in this area included overuse of graphics, non-working parts, not allowing any interaction on the part of the user, and probably most importantly, not doing anything more with the website than what other media accomplishes. Too many websites were nothing more than a

description of the hospital facilities. This is something that can be accomplished in a brochure. The Web is not just a mass distribution tool. That is certainly a large part of its usefulness, but it also allows so much more to be done with information. The sites that provided health information, not only on their website, but links to other health related sites, were the most satisfying to use. They call it a web for a reason. Its purpose is not only to provide information at that particular website, but also to join users to other information around the world that might be of use to them. Simply putting up a website with a few graphics and dumping a description of facilities on it does not make full use of the Web. They are selling themselves and their users short when they do this. Additionally, allowing the user to interact creates a far greater sense of satisfaction. Whether it is the ability to schedule an appointment, get a physician referral online, or fill out a risk assessment questionnaire for a particular disease, all allow them to feel as if they are getting a little something more.

The content category, which was the one with the lowest scores, is arguably the more important. It is important for a user to be provided with information concerning the content of the website. Users should know what an organization is hoping to accomplish with the website, and possibly more important, what they do not intend to do with the website. This is particularly important for a site that is providing the public with information that effects quality of life such as that in the medical field. Those who use their site need to know from where the information came and the extent to which they can rely on it. It is also important to know how current it is and who they can contact in case of questions concerning the material found. Although most websites did provide contact information, many did not provide update, source, or reliability information.

There are several recommendations for improvements that not only apply to the websites evaluated in this study, but to any website. First, attention must be given to the actual information

being provided, its quality and format. Prepare a section about the website letting users know what is there and what is not. Document the origin of the material contained on the site and, most definitely, state in an obvious location when the information was last updated. Graphics should be used of course, they are what make the Web fun and colorful. Be careful, however, that they are not being used just for the sake of using them or to disguise the lack of any real content. They should have relevance to the content and be clearly understood by the user. Also, it should be remembered that there are still users who access the Web via ASCII browsers. Overuse of graphics without text options makes it impossible for them to use a website. Finally, give users the opportunity to interact. Let them feel as though they are able to do something other than just passively read text. That is something they can do with any printed document. Although the Web can be a wonderful tool for informing the public about an organization or business, it can leave a bad impression if the site is frustrating, uninformative, or simply boring.

APPENDIX A: HOSPITAL WEBSITE SEARCH

Name and Location	NO	YES
Brookwood Medical Centers - Birmingham, AL	X	
University of Alabama Hospital - Birmingham, AL	X	
Eliza Coffee Memorial Hospital - Florence, AL	X	
Mobile Infirmary Medical Center - Mobile, AL		X
Good Samaritan Regional Medical Center - Phoenix, AZ	X	
Maricopa Medical Center - Phoenix, AZ		X
St. Joseph's Hospital and Medical Center - Phoenix, AZ	X	
Tucson Medical Center - Tucson, AZ	X	
Baptist Medical Center - Little Rock, AR	X	
Fresno Community Hospital and Medical Center - Fresno, CA	X	
Long Beach Memorial Medical Center - Long Beach, CA	X	
Cedars-Sinai Medical Center - Los Angeles, CA		X
KFH Sunset - Los Angeles, CA	X	
LAC-USC Medical Center - Los Angeles, CA	X	
UCLA Medical Center - Los Angeles, CA		X
Sharp Memorial Hospital - San Diego, CA		X
Medical Center at UCSF - San Francisco, CA	X	
Stanford University Medical Center - Stanford, CA		X
Porter Memorial Hospital - Denver, CO	X	
Presbyterian-St. Lukes Medical Center - Denver, CO	X	
St. Anthony Hospital Center - Denver, CO	X	
Hartford Hospital - Hartford, CT		X
St. Raphael Healthcare System - New Haven, CT		X
Yale-New Haven Hospital - New Haven, CT		X
Washington Hospital Center - Washington DC		X
Halifax Medical Center - Daytona Beach, FL	X	
Broward General Medical Center - Ft. Lauderdale, FL	X	
Holy Cross Hospital - Ft. Lauderdale, FL	X	
Lee Memorial Hospital - Ft. Myers, FL	X	
Shands Teaching Hospital and Clinic - Gainesville, FL		X
Memorial Regional Hospital - Hollywood, FL		X
St. Vincent's Medical Center - Jacksonville, FL	X	
Holmes Regional Medical Center - Melbourne, FL	X	
Baptist Hospital of Miami - Miami, FL		X
James Jackson Memorial Hospital - Miami, FL	X	

Name and Location	NO	YES
Florida Hospital Medical Center - Orlando, FL		X
Orlando Regional Medical Center - Orlando, FL		X
HCA West Florida Regional Medical Center - Pensacola, FL	X	
Sarasota Memorial Hospital - Sarasota, FL		X
Tallahassee Memorial Regional Medical Center - Tallahassee, FL		X
St. Joseph's Hospital - Tampa, FL	X	
Tampa General Hospital - Tampa, FL		X
St. Mary's Hospital - West Palm Beach, FL	X	
Georgia Baptist Medical Center - Atlanta, GA	X	
Northside Hospital - Atlanta, GA	X	
Piedmont Hospital - Atlanta, GA	X	
University Health Services - Augusta, GA	X	
Dekalb Medical Center - Decatur, GA		X
Northeast Georgia Medical Center - Gainesville, GA	X	
Queens Medical Center - Honolulu, HI		X
Cook County Hospital - Chicago, IL	X	
Columbia Michael Reese Hospital and Medical Center - Chicago, IL	X	
Northwestern Memorial Hospital - Chicago, IL		X
Our Lady of Resurrection Medical Center - Chicago, IL	X	
Resurrection Medical Center - Chicago, IL	X	
University of Chicago Hospitals - Chicago, IL		X
Saint Francis Hospital - Evanston - Evanston, IL		X
St. Joseph Medical Center/Franciscan Sisters - Joliet, IL	X	
Foster G. McGaw Hospital (Loyola University) - Maywood, IL	X	
St. Francis Medical Center - Peoria, IL	X	
Memorial Medical Center - Springfield, IL	X	
St. John's Hospital - Springfield, IL	X	
Indiana University Hospitals - Indianapolis, IN	X	
St. Vincent Hospitals and Health Services - Indianapolis, IN		X
Ball Memorial Hospital - Muncie, IN	X	
Mercy Hospital Medical Center - Des Moines, IA		X
University of Iowa Hospitals and Clinics - Iowa City, IA		X
Marian Health Center - Sioux City, IA	X	
St. Joseph Medical Center - Wichita, KS	X	
Wesley Medical Center - Wichita, KS	X	
Owensboro-Daviess County Hospital - Owensboro, KY	X	
St. Francis Medical Center - Monroe, LA		X
Medical Center of Louisiana-East Campus - New Orleans, LA	X	
Southern Baptist Medical Center - New Orleans, LA	X	
Schumpert Medical Center - Shreveport, LA	X	
Maine Medical Center - Portland, ME		X

Name and Location	NO	YES
Johns Hopkins Bayview Medical Center - Baltimore, MD		X
Johns Hopkins Hospital - Baltimore, MD	X	
University of Maryland Medical System - Baltimore, MD		X
Massachusetts General Hospital - Boston, MA		X
Lawrence F. Quigley Memorial Hospital - Chelsea, MA	X	
Metrowest Medical Center - Framingham, MA		X
Harper Hospital - Detroit, MI	X	
Henry Ford Hospital - Detroit, MI		X
Sinai Hospital - Detroit, MI	X	
Hurley Medical Center - Flint, MI		X
St. Joseph's Hospital - Mount Clemens, MI	X	
Fairview Riverside Medical Center - Minneapolis, MN	X	
St. Mary's Hospital-Rochester - Rochester, MN	X	
St. Cloud Hospital - Saint Cloud, MN	X	
St. Luke's Hospital - Chesterfield, MO	X	
Heartland Hospital - Saint Joseph, MO	X	
Barnes Hospital - Saint Louis, MO	X	
Deaconess Medical Center-Central - Saint Louis, MO		X
St. Anthony's Medical Center - Saint Louis, MO	X	
Lester E. Cox Health Systems - Springfield, MO		X
Bergman Mercy Medical Center - Omaha, NE	X	
Sunrise Hospital and Medical Center - Las Vegas, NV		X
University Medical Center-Southern Nevada - Las Vegas, NV	X	
West Jersey Hospital-Camden - Camden, NJ	X	
JFK Medical Center - Edison, NJ		X
Morristown Memorial Hospital - Morristown, NJ		X
Medical Center at Princeton - Princeton, NJ		X
Community-Kimball Medical Center - Toms River, NJ		X
Albany Medical Center Hospital - Albany, NY	X	
United Health Services Hospital-Binghamton - Binghamton, NY	X	
Bronx Municipal Hospital Center (Jacobi Med Ctr) - Bronx, NY	X	
Bronx-Lebanon Hospital Center - Bronx, NY	X	
Lincoln Medical and Mental Health Center - Bronx, NY	X	
Montefiore Medical Center - Bronx, NY	X	
Brookdale Hospital Medical Center - Brooklyn, NY	X	
Brooklyn Hospital Center - Brooklyn, NY	X	
Interfaith Medical Center - Brooklyn, NY	X	
Kings County Hospital Center - Brooklyn, NY	X	
Maimonides Medical Center - Brooklyn, NY		X
New York Methodist Hospital - Brooklyn, NY	X	
Woodhull Medical and Mental Health Center - Brooklyn, NY	X	

Name and Location	NO	YES
The Buffalo General Hospital - Buffalo, NY	X	
Elmhurst Hospital Center - Elmhurst, NY	X	
Episcopal Health Services - Far Rockaway, NY		X
New York Medical Center of Queens - Flushing, NY	X	
Catholic Medical Center (4 divisions) - Jamaica, NY	X	
North Shore University Hospital - Manhasset, NY		X
Winthrop-University Hospital - Mineola, NY	X	
Long Island Jewish Medical Center - New Hyde Park, NY		X
Bellevue Hospital Center - New York, NY	X	
Beth Israel Medical Center - New York, NY		X
Cabrini Medical Center - New York, NY	X	
Metropolitan Hospital Center - New York, NY	X	
Mt. Sinai Hospital - New York, NY	X	
Tisch Hospital - New York, NY		X
Westchester County Medical Center - Valhalla, NY		X
University of North Carolina Hospitals - Chapel Hill, NC	X	
Duke University Hospital - Durham, NC		X
Cherry Hospital - Goldsboro, NC	X	
Moses H. Cone Memorial Hospital - Greensboro, NC		X
Pitt County Memorial Hospital - Greenville, NC	X	
Dorothea Dix Hospital - Raleigh, NC	X	
Wake Medical Center - Raleigh, NC	X	
New Hanover Regional Medical Center - Wilmington, NC	X	
Trinity Medical Center - Minot, ND		X
Akron General Medical Center - Akron, OH		X
Summa Health System - Akron, OH		X
Christ Hospital - Cincinnati, OH	X	
Good Samaritan Hospital - Cincinnati, OH	X	
University of Cincinnati Hospital - Cincinnati, OH	X	
Fairview General Hospital/Health Clinic - Cleveland, OH	X	
University Hospitals of Cleveland - Cleveland, OH		X
Riverside Methodist Hospitals - Columbus, OH	X	
Miami Valley Hospital - Dayton, OH	X	
The Toledo Hospital - Toledo, OH		X
Youngstown Hospital Association - Youngstown, OH	X	
Baptist Medical Center of Oklahoma - Oklahoma City, OK	X	
St. John Medical Center - Tulsa, OK		X
Providence St. Vincent Medical Center - Portland, OR	X	
Abington Memorial Hospital - Abington, PA	X	
Lancaster General Hospital - Lancaster, PA		X
Hahnemann University Hospital - Philadelphia, PA	X	
Philadelphia Geriatric Center Friedman Hospital - Philadelphia, PA	X	

Name and Location	NO	YES
Thomas Jefferson University Hospital - Philadelphia, PA		X
Mercy Hospital of Pittsburgh - Pittsburgh, PA		X
Presbyterian University Hospital - Pittsburgh, PA	X	
St Francis Medical Center - Pittsburgh, PA		X
Western Pennsylvania Hospital - Pittsburgh, PA		X
Anderson Area Memorial Hospital - Anderson, SC	X	
Medical University of South Carolina - Charleston, SC		X
Richland Memorial Hospital - Columbia, SC		X
Greenville Memorial Hospital - Columbia, SC	X	
St. Mary's Medical Center - Knoxville, TN		X
Regional Medical Center at Memphis - Memphis, TN	X	
St. Francis Hospital - Memphis, TN	X	
Baptist Hospital - Nashville, TN	X	
Vanderbuilt University Hospital - Nashville, TN		X
Seton Medical Center - Austin, TX		X
Baylor University Medical Center - Dallas, TX		X
Medical City Dallas Hospital - Dallas, TX	X	
Harris County Hospital District - Houston, TX	X	
Hermann Hospital - Houston, TX	X	
Memorial Hospital System - Houston, TX	X	
Memorial Hospital-Memorial City - Houston, TX	X	
Methodist Hospital - Houston, TX		X
St. Joseph Hospital - Houston, TX	X	
Methodist Hospital - Lubbock, TX	X	
University of Virginia Medical Center - Charlottesville, VA		X
Fairfax Hospital - Falls Church, VA		X
Riverside Regional Medical Center - Newport News, VA		X
Hiram W. Davis Medical Center-Central State Hospital - Petersburg, VA	X	
Medical College of Virginia Hospital - Richmond, VA	X	
St. Joseph's Hospital - Marshfield, WI	X	
St. Joseph's Hospital - Milwaukee, WI	X	
St. Luke's Medical Center - Milwaukee, WI	X	

APPENDIX B: EVALUATION CRITERIA SURVEY

Hospital Name_____

Location _____

URL_____

List of Criteria	Criteria Met?	
Access		
Is the site useful with an ASCII browser?	YES	NO
Is it usually possible to reach the site?	YES	NO
Is the Uniform Resource Locator (URL) stable?	YES	NO
Do all parts load in 10 seconds or less?	YES	NO
Are all parts of the site open to all users?	YES	NO
If not, are rules for use stated up front?	YES	NO
Design		
Are the individual web pages concise?	YES	NO
Do essential instructions appear before links and interactive portions?	YES	NO
Are links logical and necessary?	YES	NO
Do all the parts work?	YES	NO
Is using the site intuitive?	YES	NO
Does it do more than can be done with other media?	YES	NO
Can the user interact?	YES	NO
If so, are interactions secured?	YES	NO
Content		
Are the scope and limits of the website clearly stated?	YES	NO
If so, does the content fit the stated scope?	YES	NO
Does the content provide information for the general public?	YES	NO
Is the content suitable to the expected audience?	YES	NO
Are the links suitable to the expected audience?	YES	NO
Is information given as to when the site was last updated?	YES	NO
Is the content of ongoing use?	YES	NO
Is the origin of the content documented?	YES	NO
Is the content consistent throughout?	YES	NO
Is contact information provided for the person responsible for the content?	YES	NO

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